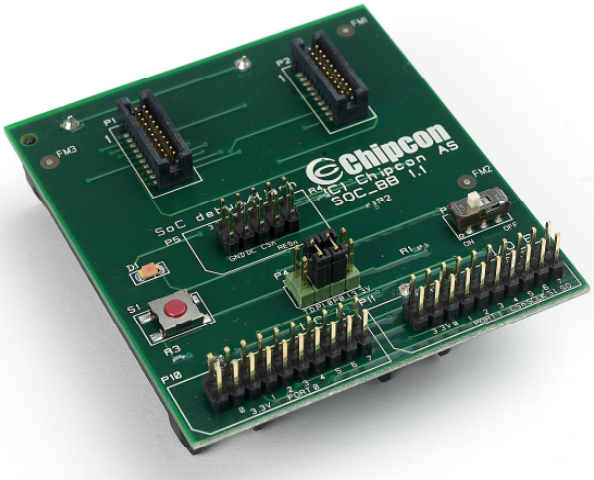
System-on-Chip Battery Board User's Guide



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1 Introduction

Thank you for purchasing a System-on-Chip Battery Board (SoC BB).

The battery board is a basic prototype board that, among many things, can be used to power standalone Low Power RF SoC Evaluation Modules (EM), like the CC1110EM, CC2510EM, CC2430EM and CC2530EM, via two 1.5V AA batteries. The board provides easy access to all of the SoC's I/O and has a separate header for the debug interface.

The battery board can also be used to simplify the connection of LPRF Transceiver EMs, like the CC1101EM, CC2500EM and CC2520EM, to a separate microcontroller board. See chapter 5.4 for details.

2 About this Manual

This manual describes the SoC Battery Board hardware.

3 Acronyms and Definitions

BB	Battery Board
DC	Debug Clock
DD	Debug Data
DK	Development Kit
EB	Evaluation Board
EM	Evaluation Module
EMK	Evaluation Module Kit
IC	Integrated Circuit
ICE	In Circuit Emulator
LED	Light Emitting Diode
LPRF	Low Power RF
MCU	Micro Controller
MISO	Master Out Slave In
MOSI	Master In Slave Out
NC	Not Connected
RF	Radio Frequency
SoC	System on Chip
SPI	Serial Peripheral Interface
TI	Texas Instruments
UART	Universal Asynchronous Receive Transmit

The term CCxx00 used in this document is a common denominator for the devices CC1100, CC1100E, CC1101, CC1150, CC2500 and CC2550.

4 Kit Contents

The SoC BB kit includes one Battery Board, providing a simple platform for making RF prototype systems using either a Low Power RF Transceiver or System-on-Chip from Texas Instruments.

All I/O pins from the transceiver and/or SoC are available on pin connectors on the Battery Board, allowing easy interconnection to external peripherals and external microcontrollers.

Batteries are not included.

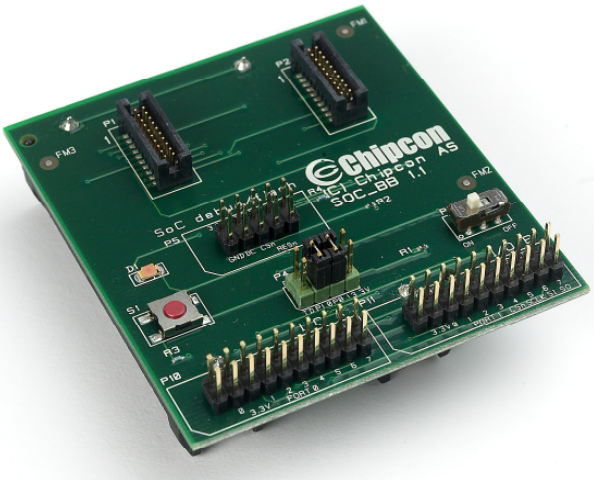


Figure 1 - SoC Battery Board

5 Hardware Description

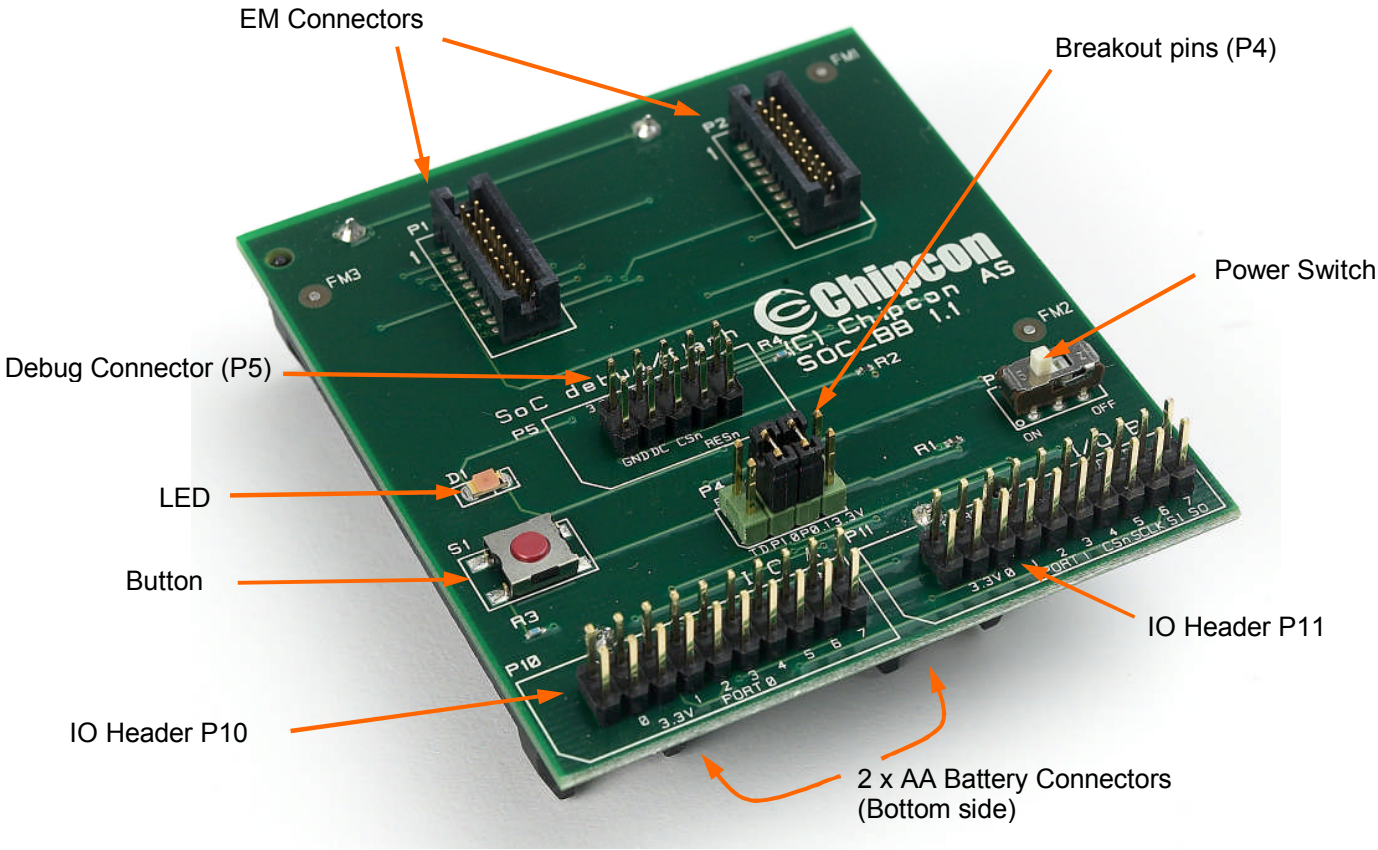


Figure 2 - SoC Battery Board details

5.1 LED, Button and Breakout Header P4

The push button S1 and LED D1 are provided as user interfaces and are routed to signals on the EM connector, which in turn are connected to signals on the System on Chip (not connected for transceivers). It is required to place two jumpers on P4 in order to use the button and LED:

- Place a jumper on pin 3 and 4 to control the LED with SoC pin P1.0
- Place a jumper on pin 5 and 6 to capture the Button event on SoC pin P0.1

See the table below for details.

Pin #	Connected to	Comment
1	P11_17/P1_18	When SoC EM connected, signal goes to P1.6 (UART TD on USART1, alt 2)
2	P11_19/P1_20	When SoC EM connected, signal goes to P1.7 (UART RD on USART1, alt 2)
3	P11_05/P1_06	When SoC EM connected, signal goes to P1.0
4	LED	Active low
5	P10_07/P1_05	When SoC EM connected, signal goes to P0.1
6	Push Button	Active low (43kOhm pull up)
7	VDD	
8	GND	

Table 1 - Breakout header (P4)

5.2 Debug Connector P5

The board is also equipped with a debug connector, allowing debugging of the application running on the SoC by using an external ICE (like the CC-Debugger [2], SmartRF04EB [4] or SmartRF05EB [3]). The pin-out of the debug connector is detailed in the table below.

Pin #	Name	Note	Pin/Function on SoC EM	Pin/Function on CCxx00EM	Pin/Function on CC2520EM
1	GND				
2	VDD				
3	DC	4.7kOhm pull down	P2.2	GDO2	GPIO3
4	DD		P2.1	GDO0	VREG_EN
5	CSn		P1.4	CSn	CSn
6	SCLK		P1.5	SCLK	SCLK
7	RESETn	43kOhm pull up	RESETn	NC	RESETn
8	SI		P1.6	MOSI	MOSI
9	NC				
10	SO		P1.7	MISO	MISO

Table 2 - Debug connector (P5)

Note that, in addition to the signals required for the debug interface (DD/DC/RESETn), there are 4 signals available (CSn, SCLK, SI, SO).

- In case you have connected a TI LPRF Transceiver EM (e.g. CC1101EM, CC2500EM and CC2520EM), the 4 signals correspond to the transceiver's SPI interface.
- In case you have attached a TI LPRF SoC EM (e.g. CC1110EM, CC2510EM, and CC2530EM), the 4 signals correspond to port 1, pins 4 through 7, which is the USART1 (location alternative 2) peripheral on the SoC. This serial peripheral can be programmed to operate in either UART or SPI mode.

5.3 EM Connectors P1 and P2

The EM connector pin-out is shown in the table below. The table shows that all signals are routed to either P10 or P11, except a few signals that are connected directly to GND or VDD.

Connection to P10/P11	P1	P1	Connection to P10/P11
GND	1	2	NC
P10_13	3	4	P11_11
P10_07	5	6	P11_05
P10_09	7	8	NC
P10_11	9	10	P11_06
P10_03	11	12	P11_08
P11_07	13	14	P11_13
P10_17	15	16	P11_15
P10_19	17	18	P11_17
GND	19	20	P11_19

Connection to P10/P11	P2	P2	Connection to P10/P11
NC	1	2	GND
NC	3	4	GND
NC	5	6	GND
VDD	7	8	GND
VDD	9	10	GND
NC	11	12	GND
NC	13	14	GND
P11_16	15	16	GND
P11_09	17	18	P10_15
P11_04	19	20	P11_18

Table 3 - EM connector pin-out

The part number of the EM connector sitting on the SoC Battery Board is TFM-110-02-SM-D-A-K-TR from Samtec. It mates with the SFM-110-02-SM-D-A-K-TR, also from Samtec.

5.4 IO Header P10 and P11

The IO headers P10 and P11 provide access to all IO on the board. The two tables below show how the various pins on the EM connectors and header P4/P5 are connected to pins on header P10 and P11. It also shows the corresponding functions on the EM board for different devices. For example, if you plug in a SoC EM, like the CC2530EM, you will get the SoC port 1 pin 2 on P11_09.

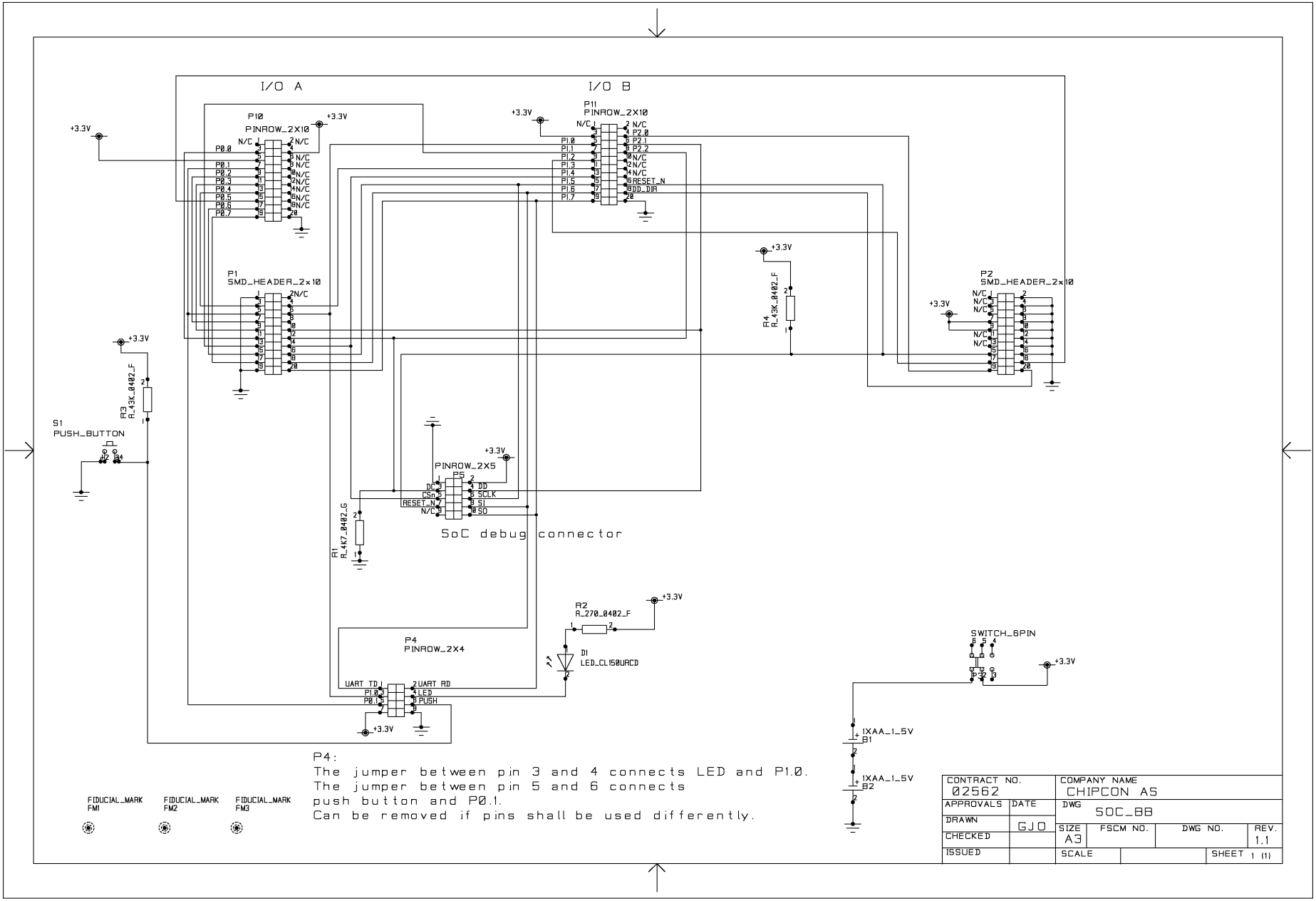
P10 Pin	Function on BB				Port/Pin on SoC EM	Port/Pin on CCxx00EM	Port/Pin on CC2520EM
	Other	P4	P5	EM			
1	NC				-	-	-
3				P1_11	P0.0	NC	NC
5	VDD				-	-	-
7		P4_05		P1_05	P0.1	NC	NC
9				P1_07	P0.2	NC	GPIO1
11				P1_09	P0.3	NC	GPIO2
13				P1_03	P0.4	NC	GPIO0
15				P2_18	P0.5	NC	GPIO4
17				P1_15	P0.6	NC	NC
19				P1_17	P0.7	NC	NC
2	NC				-	-	-
4	VDD				-	-	-
6	NC				-	-	-
8	NC				-	-	-
10	NC				-	-	-
12	NC				-	-	-
14	NC				-	-	-
16	NC				-	-	-
18	NC				-	-	-
20	GND				-	-	-

Table 4 - IO header P10 pin-out and interconnections

P11 Pin	Function on BB				Port/Pin on SoC EM	Port/Pin on CCxx00EM	Port/Pin on CC2520EM
	Other	P4	P5	EM			
1	NC				-	-	-
3	VDD				-	-	-
5		P4_03		P1_06	P1.0	NC	NC
7				P1_13	P1.1	NC	NC
9				P2_17	P1.2	NC	NC
11				P1_04	P1.3	NC	NC
13			P5_05	P1_14	P1.4	CSn	CSn
15			P5_06	P1_16	P1.5	SCLK	SCLK
17		P4_01	P5_08	P1_18	P1.6	MOSI	MOSI
19		P4_02	P5_10	P1_20	P1.7	MISO	MISO
2	NC				-	-	-
4				P2_19	P2.0	NC	GPIO5
6			P5_04	P1_10	P2.1/DD	GDO0	VREG_EN
8			P5_03	P1_12	P2.2/DC	GDO2	GPIO3
10	NC				-	-	-
12	NC				-	-	-
14	NC				-	-	-
16			P5_07	P2_15	RESETn	NC	RESETn
18				P2_20	NC	GND	NC
20	GND				-	-	-

Table 5 - IO header P11 pin-out and interconnections

6 Schematics



7 References

[1] SoC Battery Board product web site
http://focus.ti.com/docs/toolsw/folders/print/soc-bb.html

[2] CC Debugger User's Guide
www.ti.com/lit/swru197

[3] SmartRF05EB User's Guide
www.ti.com/lit/swru210

[4] CC2430DK User Manual
www.ti.com/lit/swru133

8 Document History

Revision	Date	Description/Changes
-	2009-09-29	First revision.

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